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TRANSLATOR'S AFFIDAVIT

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I am familiar with the English and German languages;

I have read a copy of the German-language document  
PCT/DE2004/000252 filed 12 February 2004 as WO 2004/073960; and

The hereto-attached English-language text is an accurate  
translation of this German-language document.

  
Herbert Dubno

Sworn to and subscribed before me  
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## TRANSLATION

## PRESSURE STAMP DEVICE FOR FILM SEALING

The invention relates to a pressure stamp device for the sealing [welding] of film with a heatable stamp element with a stamp surface for exerting a pressure upon a first foil [film] to bond it with a second foil [film] supported thereagainst.

Pressure stamp devices of the type described at the outset are used in the state of the art in order to produce a permanent connection between two films. The known devices have, however, the disadvantage that a uniformly distributed uniform pressing of one foil by a stamping element is not possible. This is because of the following:

Conventional pressing stamp devices are, as a rule, heated directly by heating elements received in bores and are made primarily from steel or another hard metal. Indirect heating has a nonhomogeneous temperature distribution within the press stamp with the consequence that in the vicinity of a heating element, the pressing stamp has a higher temperature than in the regions which are remote from a heating element. This means that the heating process required for the connection of the two foils will have different effects including the effect of different degrees of expansion at different locations of the steel of the pressing stamp

and such that in the stamping surface a height profile will develop which will prevent a uniform application of pressure to the foil so that the projecting stamp regions will apply a higher pressure to a film than the set back stamp regions. In regions of comparatively lower pressure, there is a poorer welding of the two films. Graphically a film will have a thickness of  $20\mu$  and tolerance deviations caused by the pressure stamp can correspond also to about  $20\mu$  and thus give rise to significant collective defects. The steel of the pressing stamp may have typically a temperature of about  $150^{\circ}$  to about  $250^{\circ}\text{C}$ .

The object of the invention is, therefore, to provide a pressing stamp device which will have a homogeneous internal temperature distribution to thereby minimize the development of height profiles at the pressing surface.

For a device of the type described at the outset, this object is achieved in that the stamping element is constructed with a multilayer configuration and comprises substantially three layers, whereby a heated central layer of a first material with a high thermal conductivity value is flanked by two peripheral layers of a second material and the face of one of the peripheral layers forms the stamping surface.

Preferred embodiments or features of the invention are the subject of the dependent claims.

With the device according to the invention, through the combination of features that the stamping element is configured to be multilayered and includes substantially three layers, whereby a heated central layer of a first material with a high thermal conductivity value is surrounded or embraced by two peripheral layers of a second material and a face of one of the peripheral layers forms the stamping surface, a device is obtained in which because of the higher thermal conductivity of the material of the central layer in combination with the symmetrical sandwich construction of the stamping element, internal stresses are avoided which might otherwise arise from different temperature expansion coefficients of the materials of the central layer and the peripheral layers and cause a lateral bending of the stamping element as was the case with a thermally asymmetrical and, for example, two layer construction of the bimetallic strip type in the past.

In a configuration of the central layer of copper, the thermal conductivity with respect to the peripheral layers which can be composed of steel, is about 7x higher so that a substantially homogeneous temperature distribution can be achieved in the central layer which functions as a heating element for the two steel layers above and below it in the sandwich construction and from the peripheral layers.

Quintessentially, therefore, with the configuration according to the invention of the press stamping device, at practically all temperatures the stamping layer will have an unusually planar conformation which will insure that in the heating up process there will be parallel expansion between the different material layers longitudinally exclusively at the interfaces between the layers of different materials precluding a lateral curvature of the type which can arise in a bimetallic strip. The device according to the invention is thus configured with thermal symmetry. The peripheral layers are thus constructed to fulfill the requirements of material hardness which may be necessary for the stamping process.

According to a first preferred embodiment of the device of the invention, the two peripheral layers will have identical thicknesses. In this manner, a thermal symmetry can be achieved in a very simple mechanical manner. The thermal heating required for a bonding or welding process between two firms can be achieved advantageously through heating elements which are provided in bores of the central layer. The heating elements are thus advantageously formed by electrically heatable heating wires.

The central layer can, for example, be made from copper or aluminum and has typically a thickness of about 20 mm. The peripheral layers can, for example, if being made from steel and can typically have a thickness of about 10mm to 15mm.

The stamping element is preferably of rectangular configuration. Alternatively the stamping element can have a circular configuration. Advantageously the stamping element can be of a square configuration. Advantageously the stamping element can be of a square configuration and then typically will have an edge length of about 300 mm.

According to a further preferred embodiment of the device of the invention it is provided that in an off-center region the peripheral layer of the stamping element is configured with an elongated hole and in the region of this elongated hole, the central layer is configured with a bore in which a further pin is fitted and which is slidable in the elongated hole. Thereby a retention of the various layers together while a preclusion of a lateral shift of the different layers can be achieved.

According to a further important preferred embodiment, the device of the invention is so provided that in an off-center region of the stamping element an elongated hole which traverses all of the layers is provided and in that hole a further pin is fitted. In that manner a rotation of the various layers is prevented even under thermal conditions which might cause such rotation because of different magnitudes of the thermal expansion of the layers. The peripheral layers of the device according to

the invention are preferably secured together through screws through the central layer.

The device according to the invention is described below in connection with a preferred embodiment which is illustrated in the Figures of the drawing. These show:

FIG. 1 a first preferred embodiment of the device according to the invention in a perspective view from above;

FIG. 2 the preferred embodiment illustrated in FIG. 1 of the device according to the invention in a cross sectional view.

The pressure stamp device 100 according to the invention shown in Figures 1 and 2 for the sealing of foils comprises a heatable stamping element 110 with a stamping surface 114 for applying a pressure to a first foil 200 in order to bond this film or foil to a second foil or film 210 supported beneath the first, whereby according to the significant aspect of the invention the stamping element 110 has three layers 111, 112, 113, whereby a heated central layer 111 of a first material with a high thermal conductivity value is flanked by two peripheral layers 112, 113 of a second material and the surface 114 is formed by one of the peripheral layers 112, 113. In the central layer 111 bores 115 are formed through which the electrically heatable heating wires 116 are guided as heating elements.

The stamping element 110 has a square configuration and has an edge length of about 300 mm, whereby the two peripheral layers 112, 113 are of identical thickness. The central layer 111 is made from copper and has a thickness of about 20 mm. The peripheral layers 112, 113 are each made of steel and have a thickness of about 12 mm.

In an off-center region 117, the peripheral layers 112, 113 of the stamping element 110 have a longitudinal hole [slot] 118 whereby in the region of the slot 118 in the central layer 111, a bore 119 is formed in which a further pin 120 is fitted and which is slidable in the slot 118. In addition in a central region 121 of the stamping element 110, a bore 123 extends through all layers and in that bore a further pin 122 is fitted.

The peripheral layers 112, 113 are secured fixedly together by screws 130 traversing the central layer 111.

The above-described embodiment of the invention serves only for the purpose of a better understanding of the teachings according to the invention defined by the claims which, as such, are not limited by the embodiment.